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IMPLEMENTING ICT IN MUSIC EDUCATION IN PRIMARY SCHOOL

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Abstract. *Within the education system of the Republic of Serbia, music education is viewed as an important segment in the educational and developmental pathway that contributes to the cultural development of pupils and the formation and enhancement of their musical preferences. In recent years, teaching practices in music education have shown tendencies toward modernization and improvement of the educational process. For the purposes of this research, a questionnaire was designed and an exploration was conducted involving 126 elementary school teachers (N=126) from the Republic of Serbia. The research was empirical, utilizing non-experimental, and descriptive methods and survey technique. In this paper, the author analyses the experiences and attitudes of elementary school teachers regarding the implementation of information and communication technology (ICT), digital resources and their positive influence on the teaching of music education. In the context of using specific software and applications, a high proportion of respondents appear to lack competencies necessary for a more concrete and consistent application when covering specific areas in the music education syllabus. Among the total number of respondents from the territory of the Republic of Serbia, the majority of 81,7% support the implementation of innovations that involve active use of ICT resources in everyday teaching. However, greater discrepancies are noticeable when it comes to the specific software and tools and their application in covering areas of the music education syllabus. Experience shows that it is necessary to initiate and accelerate efforts to improve the digital competencies of elementary school teachers to enable pupils to reach their full potential.*

Key words: *music education classes, elementary school teacher, pupils, information-communication technology (ICT)*

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1. INTRODUCTION

Constant technological development has marked the beginning of the 21st century, significantly expanding and altering the ways knowledge is acquired and information is exchanged. Therefore, methods of working and learning need to involve and be adapted to the information-communication technology (ICT).

The continuous development of the internet has influenced innovation in the design and implementation of the learning process, i.e. the educational process. Certainly, the pandemic period accerelated and, in a way, initiated the broader use of ICT resources in schools, and it soon became evident that the changes and the innovations were making the process of acquiring new knowledge simpler, and at the same time more efficient.

The use of ICT resources is becoming increasingly necessary in the teaching process, especially in communication aspects. Relatedly, various ICT resources and equipment should be seen as phases of the socialization of a modern-day pupil, who demands constant improvement and application to develop their digital culture, which often changes in content and form (Mayos & Brey,2015).

Technology and digital resources contribute to the creation and application of learning new theories in the modern information age. New technology in the classroom represents a form of integration between contemporary achievements in pedagogical science and tools from information and computer technology (Novković Cvetković, 2017).

By applying modern educational technology, the position and role of the pupil in the educational process are significantly altered. The pupil becomes an active participant, initiator and doer, with their activity supported and guided by visual and auditory representations through digital resources. Therefore, technology facilitates connecting, cooperation among pupils, creative production, and the formation of interactive relationships between music and pupils (Ivanović, 2019).

Based on the data gathered from the research conducted, we were able to examine the actual need for and the frequency of using ICT resources and their products which include software and applications/tools, within the context of teaching specific contents and areas of Music Education. The practical contribution of the research lies in obtaining cross-section data on the availability and use of modern technology in Music Education classes in elementary schools. The results obtained point to the need for further innovation in teaching practices to increase the motivation of all active participants in the teaching process. This would have a direct positive influence on the success rate of acquiring and understanding subject material and skills development in elementary school pupils. It would also contribute to developing pupils' individual musical abilities, and improving digital literacy and competencies of both teachers and pupils.

1.1. Active use of information-communication technology (ICT) and its resources in everyday teaching practice

The process and flow of the teaching practice need to reflect the changes and keep up with the development of science and technology. This is why we can expect the active application of modern educational technology in the teaching process, regardless of the school subject (Cekić–Jovanović, 2020). In order to improve the process as a whole, various innovations are used, such as combining several teaching methods, but most often through the use of digital resources. Therefore, the education system could not remain immune to the changes happening within the field of technological innovation.

The Republic of Serbia has issued several strategic and planning documents, thus paving the way towards a more active implementation of innovation into the teaching practice. The *Framework of Digital Competencies* (*Okvir digitalnih kompetencija,* 2023), in addition to offering strong support and useful instructions for the teachers, defines the teachers' competencies, and through digital support, indicates learning as a way of satisfying individual pupils' needs. In addition, it stresses the necessity of digital support to pupils by their teachers who "should provide them with tools for active participation in social life and work in the new digital age", while on the other hand, it aims to "support the teachers in the process of integrating digital concepts, tools and contents into the everyday teaching practice" (Okvir digitalnih kompetencija, 2023, 5-7).

We should also mention the *Strategy for Development of Education in Serbia by 2030* (*Strategija razvoja obrazovanja u Republici Srbiji do 2030. godine*, SROS 2021), which, as the umbrella document, involves and affects the harmonization of Serbia's educational policy with the tendencies in Europe and the world. Therefore, a specific goal has been defined with the aim of laying the foundation of digital education at the pre-university level. It defines digital education in two directions, as "a notion which is related to two different but complementary areas of educational policy – one involving measures oriented towards the digital competencies of teachers and pupils, and the other involving the pedagogical application of digital technologies with the aim of improving the quality of teaching and learning" (SROS, 2021, 36). The focus is on the improvement of digital capacities and competencies of pupils, but also people employed in the education system, i.e. the creation and promotion of innovative pedagogical approaches which involve the integration of ICT into the process of teaching and learning. Due to the increased acceleration of the development of technological innovation, the *Strategy for Development of Education in Serbia by 2030* stresses the necessity of continuous work on improving digital competencies through harmonizing education with contemporary trends and integrating 21st century skills into the teaching and learning process (SROS, 2021). "Key competencies should be redefined and assessment tasks should be remodeled according to new standards for what students should be able to do in order to acquire skills of the twenty-first century, in accordance with the transformation of educational standards to meet with ICT transformation and evolution" (Qafzezi & Kadi, 2023, 226).

Several authors (Akšamija and Ploskić, 2023; Arsić and Zaporožac, 2021; Jeremić et al., 2020; Ivanović, 2019; Ilić, 2019; Novković Cvetković, 2017 and 2014) state that ICT, when actively used for educational purposes, is often terminologically determined as *educational technology*. It is, in a narrower sense, observed as a systematically designed process of applying technique and technology in order to improve the quality of the teaching process.

The process of learning with the help of ICT especially emphasizes the dimension of multimediality and interactivity, because it enables "the digital information to be more easily combined with an image, animation or sound, while at the same acting complementarily by providing complete information" (Ilić, 2019, 10).

Multimedia teaching aids, devices, contents, educational software and tools, and applications enable pupils to develop their digital competences, but also to critically use knowledge sources, to learn independently, to analyze, systematize, compare, research and apply their knowledge in different situations (Cekić–Jovanović, 2020).

One of the innovative possibilities for the improvement of the process of teaching Music Education is electronic learning. This is a form of learning in which the pupil is

engaged and active throughout the teaching process. Therefore, electronic learning (e-learning) implies learning through the use of modern electronic media, which is very different from learning in the traditional teaching process. Such an approach demands changes in the core characteristics of the teaching process, starting from the goals, programs, basic forms of teaching and learning, the type of motivation for learning, the grading methods and the role of the teacher (Colić, 2021).

At the current time, which has brought an expansion of new knowledge in all of life spheres and significant changes in the field of ICT, there is a growing need for adjusting the teaching process to the new digital age (Stanojlović, 2018). Therefore, the implementation of modern technology transforms the teaching process into a digital and multimedia one (Škoro and Kir, 2021).

The use of ICT implies the adequate use of digital information in order to improve the music abilities of pupils and the possibilities for better carrying out the set goals and tasks in the educational process. By regular application in the classroom, the downsides of the traditional class system can be overcome (Akšamija and Ploskić, 2023). Consequently, it can be concluded that the use of ICT resources in everyday teaching practice is of high importance. With the help of such resources and abundant materials, pupils can organize independent learning from the earliest school days, which is a form of self-education. In addition to applying technology in the classroom, teachers should also constantly improve their competencies and be prepared for multimedia teaching, in order to ensure the highest possible efficiency of the learning process (Matijević and Topolovčan, 2017). Unfortunately, teachers often tend to opt for known methods and rarely introduce modern didactic methods and work forms (Škojo, 2016).

The role of the teachers is reflected in the planning, organization and implementation, leading the teaching process, while permanently monitoring and evaluating the student's progress, which makes them a very active participant in the entire process. It promotes learning, makes selections and uses resources in the classroom, but at the same time influences motivation and guides the way of acquiring knowledge. Effective leadership facilitates adaptation to new situations and circumstances such as the digitalization of education (Milanović et al., 2023).

"Digitization is transforming educational institutions, creating new challenges that must be addressed by all participants in the education process" (Novković Cetković et al., 2023, 190). Due to the changes that digitalization has brought into the educational system, teachers find themselves faced with various challenges. The question is how to design and apply the most efficient ways of learning in order to ensure the achievement of all the set outcomes (Škojo, 2016). At the current time, computers and the internet are present in all aspects of education: organizational, teaching, methodical, applied, etc. The modern-day teacher needs to recognize the educational potential of digital technology and easily adjust it to the needs of their pupils. However, there is a certain number of teachers who oppose it (Okvir digitalnih kompetencija, 2023). In order to improve their competencies, teachers need to be highly motivated, but it seems that in the educational process as a whole the pupil's motivation is even more important. First, the teachers themselves need to see the benefits of new ways of working and applying specific technology and resources in the classroom. They need to believe that ICT helps reach higher goals and outcomes, and that they are skilled enough to use it. They need to show willingness and openness when it comes to changing the ways of working and organizing the teaching practice, because the ICT resources will surely bring innovation into the

existing teaching practice. They need to be flexible and ready to carry out and apply different ways of teaching in order to prepare their pupils for future education. Even though each individual has different motives, it can be said that the dominant ones are the possibility of personal advancement, readiness for lifelong learning, the desire for progress of each individual, and working with pupils in general (Marinac, 2019).

In recent years, teaching subjects belonging to the social, humanistic field, as well as the arts, cannot be imagined without the presence of ICT (Novković Cvetković and Mladenović, 2021).

The importance of technology should be seen through the prism of improving the pedagogical-methodological functions. The role of digital technology in education, i.e. organizing and carrying out Music Education classes, can be significant even in the sense of rationalization. It enables the teacher to save time, and contributes to the optimization of the teaching process as a whole. This shows its real significance, and an even higher one, given that the new curricula also imply one class of Music Education per week as an imperative.

In the document *Use of Information-Communication Technology in Teaching* (*Primena informaciono-komunikacionih tehnologija u nastavi*, 2014), no specific technology, software, or tools are listed that can be used to facilitate covering specific contents in Music Education classes. However, various resources are listed, for example Weebly, WordPress, YouTube, etc. that can help teachers plan, create content, communicate, and connect with others, given that these are databases, but do not contain specific tasks explicitly related to the contents of Music Education. Therefore, the teacher is expected to be media and technologically literate, and possess the bare minimum skills to choose and apply a resource, and at the same time improve the teaching and learning process.

Having a certain level of digital literacy enables a teacher to independently access an abundance of music information through various formats, devices, and digital resources, which further enables greater possibility of spreading ideas, teaching, and communicating with pupils (Gértrudix Barrio, et al., 2016). Within this process, schools as educational institutions and centres of promoting knowledge and skills, play a significant role. They need to ensure favorable conditions, which directly affect an atmosphere suitable for the development of skills and the use of all the educational possibilities of ICT resources.

ICT resources include various devices, tools, applications, and software, which enable a variety of activities, production, and recording of sound, that can be used and integrated into Music Education classes. Numerous software, mobile phone applications such as Pocket Guitar, TabToolkit, GuitarToolkit, OmniTuner, TuneMaster, Chordplai, Chordmaster, iReal b, Guitar Lab, GrooveMaker, have created great possibilities to modernize the process of teaching and learning, as well as music pedagogy, predominantly because of their availability, ease of use through exploration, while playing and having fun with a graphical user interface (Gouzouasis & Bakan, 2011).

Global and wide usage of ICT resources offers unlimited possibilities for learning and intelligence improvement. Compatibility with traditional music technology (such as keyboards, cassette-players, record-players, CD-players, etc.) opens the possibilities for the continuity of various activities and their synthesis, thus sparking interest in the field of music culture (Gorbunova & Hiner, 2019).

Occasional use of work methods which include ICT resources can be of great help to understand individual abilities, limits and potential of pupils. By using software, tools and applications that can translate the complex process of learning music into creativity, we can enable interaction of three media (hearing-sound, visual-image and tactile-touch). An active

use of resources enables greater interaction between the teacher and the pupils, even while learning musical notation and other elements of music (Gorbunova et al., 2020).

The above implies the technical equipment of the schools, information literacy, knowledge of the English language, but also a certain level of music preferences of teachers. Also, attention should be paid to the adequate selection of a certain musical tool, which brings out the methodical skill of the teacher.

Technological innovation in teaching offers the individuals the possibility to create, connect, change the contents, and contribute to the improvement of global music practice and education. In the end, we can agree that digital resources have forever changed the ways of learning, creating, listening to and distributing music (Gouzouasis & Bakan, 2011).

The next segment of the article offers an overview of the main findings, focusing on the research conducted. Primary school teachers' attitudes and opinions were surveyed, in regard to the degree and frequency of using ICT resources, availability of specific digital devices and the internet, as well as the application of specific software and tools in Music Education classes. The author analyzed the need for a flexible combination of digital resources and subject contents in order to achieve a comprehensive and unique approach to teaching Music Education in elementary school.

2. METHOD

2.1. Sample of participants

The research was conducted during the month of May, in the academic year 2023-24. The survey involved 126 elementary school teachers who, in the current academic year, teach in the first, second, third and fourth grades of elementary school within the territory of the Republic of Serbia. The data were collected anonymously, through an online questionnaire. Table 1. shows data on the gender structure of the sample.

Table 1 Sample description

Gender		
Male	8	(6,3%)
Female	118	(93,7%)
Total	126	(100%)

The sample was purposeful and it consisted of teachers employed in elementary schools, a total of 126 (N=126). Of the total number of respondents, as it can be seen in Table 2, 11 (8,7%) graduated from college, 36 (28,6%) completed basic academic studies, and 79 respondents completed master's academic studies, which is 62,7%.

Table 2 Education level

Education	Level	
College	11	(8,7%)
Basic academic studies	36	(28,6%)
Master academic studies	79	(62, 7%)
Doctoral academic studies	/	
Total	126	(100,0%)

During the academic year 2023-24, and at the time the research was conducted, the teachers taught in the following grades: First – 25 (19,8%), Second – 34 (27%), Third – 25 (19,8%) and Fourth – 42 (33,3%). Of the total number of respondents, 70 (55,6%) work in an urban environment, namely the cities of Belgrade, Čačak, Novi Sad, Kikinda, Jagodina, Kragujevac, Niš, Sombor, Zaječar, Kruševac, Pančevo, Šabac, Prijepolje, Paraćin, Sremska Mitrovica, Bor, Smederevo, Vršac and others, while 56 respondents (44,4%) work in a rural environment, namely the villages of Mokrin, Bašaid, Zlot, Đurđin, Rogača, Martonoš, Grabovac, Rudna Glava, Putinci, Plementina, Banatsko Karađorđevo, Vračević, Gornja Trešnjevica, etc. The age range of respondents spans from 25, the age of the two youngest respondents, to 62, the age of the oldest one. The highest number of respondents is 50 years old, nine of them. The working experience of the respondents is represented in Table 3, and the percentages are similar. The highest number of respondents have up to 10 years of working experience – 36 (28,6%), then follow respondents with up to 30 years of working experience – 33 (26,2%), then those with up to 20 years of working experience – 29 (23%), and lastly the group of respondents who have more than 30 years of working experience – 28 (22,2%).

Table 3 Sample structure

Working experience		
Up to 10 years	36	(28,6%)
Up to 20 years	29	(23,0%)
Up to 30 years	33	(26,2%)
More than 30 years	28	(22,2%)
Total	126	(100,0%)

2.2. Goal, tasks and hypotheses

The research goal was to analyze the attitudes and experiences of elementary school teachers regarding the availability and application of ICT resources, i.e. different devices, digital media and specific tools which can have a positive influence on the improvement of the process of teaching Music Education. Acquiring skills and understanding the contents related to notation, rhythm, melody and other elements are the cornerstones of the subject of Music Education in elementary school.

Research tasks:

1. To find out what ICT resources are available to teachers of Music Education in elementary schools;
2. To find out to what extent elementary school teachers use ICT when teaching and revising Music Education contents;
3. To find out whether elementary school teachers use specific software and digital tools in Music Education classes in order to improve the teaching process itself.

2.3. Research hypothesis

General research hypothesis: Elementary school teachers believe that the use of ICT resources, specifically digital technology, software and tools, contributes to an easier understanding of material stipulated by the elementary education curriculum, and they have a

positive attitude towards the influence of software and digital tools on the activities carried out in Music Education classes.

The starting points in the research were the following specific hypotheses:

1. We assume that teachers have various devices such as computers, laptops, overhead projectors, smartboards their disposal in the classroom.
2. We assume that elementary school teachers use ICT resources in Music Education classes frequently.
3. We assume that elementary school teachers frequently use software/digital tools which fulfill the function of: composing, recording or editing sound/song, writing notes, learning musical notation, testing knowledge and learning about composers' works.

2.4. Method, techniques and research instruments

The research was empirical, non-experimental, and the author used the descriptive method and the survey technique. A questionnaire was constructed in the form of a Likert scale consisting of items aimed at learning about the gender, age, professional and working experience structure of the sample, as well as the availability and use of specific ICT resources in Music Education classes. The respondents assessed the items on availability and frequency of using specific devices by choosing one of the following: 1 – Never; 2 – Rarely; 3 – Sometimes; 4 – Often. The rest of the questions, which were related to the frequency of using specific software and tools in Music Education classes, offered the following options: 1 – Strongly disagree; 2 – Somewhat disagree; 3 – Somewhat agree; 4 – Strongly agree. Quantitative data was analyzed using SPSS software.

3. RESULTS

When it comes to data analysis, the chosen statistical procedures were frequency and percentage. First, the availability of an internet connection and digital technology in classrooms was checked. The respondents were expected to provide confirmation on which devices they have at their disposal during Music Education classes. The results can be seen in Table 4.

Table 4 Availability of digital technology (devices)

Question	Yes	No	Total
Do you have unlimited access to internet in your classroom?	120 (95,2%)	6 (4,8%)	126 (100%)
Do you have a computer/laptop in your classroom?	123 (97,6%)	3 (2,4%)	126 (100%)
Do you have an LCD TV in your classroom?	36 (28,6%)	90 (71,4%)	126 (100%)
Do you have a smart board in your classroom?	31 (24,6%)	95 (75,4%)	126 (100%)
Do you have an overhead projector in your classroom?	99 (78,6%)	27 (21,4%)	126 (100%)
Is a tablet available to you in the classroom to use in class?	25 (19,8%)	101 (80,2%)	126 (100%)

According to the results represented in Table 4, when teaching Music Education, the majority of elementary school teachers have at their disposal a computer/laptop – 123 (96,6%) and an OHP – 99 (78,6%). Also, it can be concluded that the majority of respondents, 120 (95,2%), are provided with unlimited internet access, which is very significant given that a lot of devices and software/tools need uninterrupted internet connection in order to function smoothly.

Table 5 Frequency of using digital technology (devices) in Music Education classes

Device/Item (N=126) Which of the devices listed do you use in Music Education classes?	1 Never	2 Rarely	3 Sometimes	4 Often
Mobile phone	13 (10,3%)	15 (11,9%)	63 (50,0%)	35 (27,8%)
Tablet	90 (71,5%)	19 (15,0%)	12 (9,6%)	5 (3,9%)
Overhead projector	15 (11,9%)	9 (7,1%)	26 (20,7%)	76 (60,3%)
LCD TV	78 (61,9%)	6 (4,8%)	19 (15,0%)	23 (18,3%)
Smart board	81 (64,3%)	8 (6,3%)	12 (9,5%)	25 (19,9%)
CD player	53 (42,0%)	17 (13,5%)	21 (16,7%)	35 (27,8%)
Computer with speakers	45 (35,7%)	9 (7,1%)	17 (13,5%)	55 (43,7%)
Laptop with speakers	12 (9,5%)	7 (5,6%)	25 (19,9%)	82 (65,0%)

The results represented in Table 5 clearly show that the majority of respondents use an overhead projector in Music Education classes – 76 (60,3%), a laptop with speakers – 82 (65%), while the percentage is a bit lower when it comes to a desktop computer with speakers – 55 in total (43,7%). Even though numerous teachers disapprove of the use of mobile phones in class, we cannot disregard the number of respondents who occasionally (sometimes) use the said device as a teaching aid – 63 (50%). The results obtained suggest that the majority of respondents have approximately equal working conditions in the sense of the availability of internet, devices and equipment, regardless of the place of school or their education level.

Therefore, it can be concluded that the first special hypothesis, which reads: *We assume that teachers have various devices such as computers, laptops, overhead projectors, smart boards at their disposal in the classroom,* was partially accepted.

According to the results obtained for the first four questions in Table 6, it can be concluded that elementary school teachers use ICT resources very often. Namely, the teachers perceive ICT as a teaching aid that facilitates activities planned for Music Education classes, which was the answer of no less than 103 respondents (81,2%), while 17 (13,5%) somewhat agreed with this item. Similar results can be seen in the next three items, which explored the use of ICT when teaching lessons and revising material. A total of 107 respondents (84,9%) believe that ICT makes teaching specific contents significantly easier, and 13 respondents (10,3%) somewhat agree with this item; while 99 (78,6%) elementary school teachers believe that revising content in Music Education classes can be better organized with the use of ICT. Nineteen respondents (15,1%) somewhat agree with the said item. When it comes to the item exploring whether they use the said devices in every Music Education class, 66 respondents (52,4%) strongly agreed, while 41 respondents (32,5%) somewhat agreed. In each of the first four items, one respondent opted for the negative answer (0,8%), except in the item saying that ICT is used in every class, which received 7 negative answers (5,6%). With the items stating that ICT resources help carry out all the activities planned, as well as the revision classes, five respondents somewhat disagreed (4%). A bit higher number of negative answers can be seen in the item stating that ICT makes revision classes easier – 7 (5,6%), while 12 (9,5%) respondents somewhat disagree with the item stating that ICT resources are used in every Music Education class.

Based on these results which show that elementary school teachers use ICT to a high extent, it can be concluded that the second special hypothesis *We assume that elementary school teachers use ICT resources in Music Education classes very often* is accepted.

Table 6 Using digital tools in Music Education classes

ITEMS	1 Strongly disagree		2 Somewhat disagree		3 Somewhat agree		4 Strongly agree	
	f	%	f	%	f	%	f	%
ICT helps me carry out planned activities during Music Education classes more easily.	1	0,8	5	4	17	13,5	103	81,7
ICT enables me to teach a lesson in Music Education more easily.	1	0,8	5	4	13	10,3	107	84,9
ICT enables me to conduct a revision class in Music Education more easily.	1	0,8	7	5,6	19	15,1	99	78,6
I use ICT resources in every class of Music Education.	7	5,6	12	9,5	41	32,5	66	52,4
When teaching Music Education, I use software/digital tools which fulfill the function of composing, recording or editing sound/songs (e.g.Musico, Sound Forge, Audacity, MidiPad 2, Cool Edit, Band in a Box).	56	44,4	27	21,4	31	24,6	12	9,5
When teaching Music Education, I use software/digital tools which fulfill the function of writing notes and easier learning of music notation (e.g.Solfeg.io, Noten learnen, Finalle, Sibelius, MuseScore, Maestro, Auralia 5).	63	50	26	20,6	27	21,4	10	7,9
When teaching Music Education, I use software/digital tools which fulfill the function of creating melodies without previous theoretical knowledge, learning tempo, or dynamics (e.g.Theory Lessons, Looper XPress, Super Dooper Music, Kid Pix, Garage Band, Perfect Pianist,SmartMusic, Auralia 5, EarMaster 6, Malleus).	54	42,9	37	29,4	26	20,6	9	7,1
When teaching Music Education, I use software/digital tools which fulfill the function of practicing hearing and rhythm (e.g.Good Ear, Rhythm Trainer, Metronom online, Rythm Teacher, Music beats, Master Ear Training, Lean to Sing, SmartMusic).	54	42,9	26	20,6	29	23	17	13,5
When teaching Music Education, I use software/digital tools which fulfill the function of creating educational music audio/video games and applications (e.g.OpenEd.com, Dave Conservatoire, AppShed, GIF - Graphics Interchange Format).	56	44,4	30	23,8	24	19	16	12,7
When teaching Music Education, I use software/digital tools which fulfill the function of knowledge testing (quizzes) (e.g.Quizizz.com, Wordwall, KDE Minuet, New York Philharmonic Kidzone).	22	17,5	18	14,3	40	31,7	46	36,5
When teaching Music Education, I use software/digital tools which fulfill the function of introducing pupils to music and work of famous composers (e.g.:Upoznajmuziku, Muzika nasvaslova, Music Theory - with audio).	23	18,3	23	18,3	38	30,2	42	33,3

The next seven items are associated with the third special hypothesis that reads: *We assume that elementary school teachers frequently use software/digital tools which fulfill the function of: composing, recording or editing sound/song, writing notes, learning musical notation, testing knowledge and learning about composers' works.* Together with the items, examples of tools known to experts and the general public as efficient and usable are given. Based on there spondents' ratings of the said items, the following conclusions have been reached.

The item stating that they use software/digital tools which fulfill the function of composing, recording or editing sound/songs (with examples of Musico, Sound Forge, Audacity, MidiPad 2, Cool Edit, Band in a Box), was rated positively by only 12 (9,5%) respondents. A high level of disagreement was expressed by 56 (44,4%) teachers, 27 (21,4%) of them somewhat disagreed, and 31 (24,6%) respondents somewhat agreed. In the next item, which questions the frequency of using software/digital tools which fulfill the function of writing notes and easier learning of music notation (e.g. Solfeg.io, Noten learnen, Finalle, Sibelius, MuseScore, Maestro, Auralia 5), agreement was expressed by only 10 (7,9%) teachers, while 27 (21,4%) somewhat agreed. As many as 63 (50%) strongly disagreed, and 26 (20,6%) somewhat disagreed. Software/digital tools which fulfill the function of creating melody without previous theoretical knowledge, learning tempo, or dynamics (e.g.Theory Lessons, Looper XPress, Super Dooper Music, Kid Pix, Garage Band, Perfect Pianist, SmartMusic, Auralia 5, EarMaster 6, Malleus) are used by only 9 (7,1%) respondents, and 26 (20,6%) somewhat agreed with this item. The number of 54 (42,9%) shows that respondents strongly disagree with the item given, and 37 (29,4) expressed partial disagreement. When it comes to using software/digital tools which fulfill the function of practicing hearing and rhythm (e.g. Good Ear, Rhythm Trainer, Metronom online, Rhythm Teacher, Music beats, Master Ear Training, Learn to Sing, SmartMusic), 17 (13,5%) teachers use them in Music Education classes, while 29 (23%) use them to a lesser degree. The same as in the previous item, 54 (42,9%) respondents strongly disagree when it comes to using the said software/tools, and 26 (20,6%) somewhat disagree. With the next item that reads: "When teaching Music Education, I use software/digital tools which fulfill the function of creating educational music audio/video games and applications (e.g. OpenEd.com, Dave Conservatoire, AppShed, GIF - Graphics Interchange Format)", 16 (12,7%) teachers strongly agreed, and 24 (19%) somewhat agreed. Software/tools which help create interactive and educational music games for the purposes of teaching Music Education are not used by 56 (44,4%) respondents, while 30 (32,8%) somewhat agreed with the said item. When it comes to using software/tools which fulfill the function of knowledge testing (quizzes) (e.g.: Quizizz.com, Wordwall, KDE Minuet, New York Philharmonic Kidzone), the results are somewhat different from those previously presented. Namely, 46 (36,5%) teachers strongly agreed with this item, i.e. they use such software/tools in their classes, and 40 (31,7%) somewhat agreed, which makes the percentage of positive answers a bit higher. Total disagreement was expressed by 22 (17,5%) respondents, and partial disagreement by 18 (14,3%), which is encouraging. Similar percentages of positive answers are seen in the item related to the use of software/tools which fulfill the function of introducing pupils to music and the work of famous composers (e.g. Upoznaj muziku, Muzika na sva slova, Music Theory - with audio). Strong agreement was expressed by 42 (33,3%) respondents, whereas a similar number of respondents somewhat agreed – 38 (30,2%). An equal number of respondents expressed strong and partial disagreement – 23 (18,3%).

After analysing the results presented, it can be concluded that elementary school teachers do not often use software/tools which fulfill the function of composing, recording or editing sound/songs. However, the degree of total and partial agreement with regard to using tools for knowledge testing and introducing composers' works is somewhat higher when compared to previous items. Therefore, it can be concluded that the third special hypothesis that reads: *We assume that elementary school teachers frequently use software/digital tools which fulfill the function of: composing, recording or editing sound/song, writing notes, learning musical notation, testing knowledge and learning about composers' works,* was partially accepted. These results and the conclusion can be justified by potential failure of respondents to recognize the given examples of software/tools within the items, which implies lack of teachers' knowledge about the ICT tools with said functions.

In light of the fact that of the three special hypotheses, one was completely and two were partially accepted, it can be concluded that the general hypothesis, that reads: *Elementary school teachers believe that the use of ICT resources, specifically digital technology, software and tools, contributes to an easier understanding of material stipulated by the elementary education curriculum, and they have a positive attitude towards the influence of software and digital tools on the activities carried out in Music Education classes,* was through this research accepted.

4. DISCUSSION

After analyzing the diversity and availability of ICT resources in the process of teaching Music Education in respondents' classrooms, it can be noted that more professional self-confidence is needed as well as a greater readiness to introduce innovations in approaches and teaching contents of the said subject. Relatedly, a statistically significant difference was observed between the items that point to the use of software and tools in specific activities and the items on the use of ICT (devices) in the teaching process in general. Specifically, elementary school teachers more often rely on using and combining different media, such as images, videos, audio recordings and presentations that they create themselves or find on the internet. Intermediality is desirable in teaching music, but the classes should not be solely based on some of the media mentioned. There is a noticeable lack of determination to use specialized software and tools which would make the teaching process more active, and the music experience more authentic, thus more deeply influencing the development of competencies for problem-solving, creativity, critical thinking and digital literacy in pupils.

Several similar studies were conducted in the region, in Europe and globally. The goal of the research conducted in Lithuania in 2017 (Abramauskienė, 2017), was to define the attitudes of teachers and music educators towards the possibilities of applying ICT resources in music classes. The results showed that more than half of respondents, 55,8% of the total 76 respondents, use a laptop in classes, as well as internet services. When it comes to the teachers' competencies for using ICT, 51,4% possess excellent ability to use technology, while 48,6% of respondents use some of the internet services/software/tools. The majority believes that the use of technology strengthens motivation in pupils, as many as 55,9%, and that it maximizes time efficiency in class – 52,7%. A number of respondents, 35,3%, believe that they lack suitable software/tools in school, and stress the need for further professional development – 32,5%. As we can see from the data obtained during research, more than a third of elementary school teachers believe that schools lack

the necessary software and that the number of courses for professional development is insufficient. The study revealed that teachers most often use computer networks and software. The most popular programs include: Sibelius, Google Chrome, PowerPoint, YouTube, music encyclopaedias, various programs for teaching music, certain programs for creating music and animated movies, programs for creating phonograms and karaoke, sound editing and recording programs, but we do not know the precise percentages.

Authors of the research conducted in the neighboring Croatia, Vesna Svalina and Mia Mucić (2022) surveyed the attitudes of students of the Faculty of Pedagogy in Osijek and Slavonski Brod, future elementary school teachers, on the use of digital technology and the significance of its use in the field of Music Education. The research involved a total of 107 respondents, which is close to our sample size (126 elementary school teachers). Expressed in percentages, the highest number of students believe that the use of information-communication resources is highly significant in the fields of listening to music – 95,3%, music games – 82,24% and teaching music in general – 85,05%, whereas a slightly lower number of students valued the use of information-communication technology in the field of music-creative production – 72,9%, singing activity – 52,34% and playing a musical instrument – 49,53%.

When comparing the results presented with our research, conducted in the Republic of Serbia, it can be concluded that the majority of elementary school teachers often use the benefits of ICT in Music Education classes, as many as 52,4%. Such a result implies agreement of respondents in both studies on the importance, availability and significance of digital technology (ICT) in teaching Music Education in general. The laptop with speakers is the device used by 65% of respondents, which is similar to the results obtained in the first study mentioned – 55,8%. When it comes to the significance of using ICT to carry out planned activities during Music Education classes more easily, the degree of strong agreement is as high as 81,7%. On the other hand, when it comes to carrying out fun and creative activities, and using tools for knowledge testing, total agreement was expressed by only 36,5% of respondents. High agreement is seen in relation to the claim that frequent use of ICT in teaching Music Education makes learning new material much easier. This is corroborated by results from 77,5% of respondents in the Republic of Croatia, whereas in our research, the percentage is as high as 81,7%.

5. Conclusion

Even though studies were conducted in our country with the aim of analyzing the role of ICT in the process of teaching Music Education and describing the application of certain software solutions and digital tools in music schools, there are no similar studies that would shed some light on the situation in lower grades of elementary school. This research and its exploration of the attitudes and knowledge of elementary school teachers on the application of ICT resources in teaching Music Education is considered significant from the perspective of further development of teaching practice in elementary schools and a more active role of teachers and pupils in creating the learning process and developing their skills.

During Music Education classes, the use of ICT resources is especially important because it enables the expansion of the experience, creative and individual expression, but it also leads to increased innovativeness within the process of learning music. It was

emphasized that these resources are especially appropriate for pupils of different interests and abilities because the availability and application of ICT tools enable the outcomes to be achieved in shorter time periods. The results of the research show that elementary school teachers understand the importance of the efficiency and implementation of ICT resources, but at the same time stress the need to organize and offer programs and courses which will include the existing and new digital music tools, software and online platforms. This would ensure a higher number of employees in elementary schools who will move beyond the current situation in the field where personal enthusiasm of individuals prevails and towards acknowledging an urgent need to improve the digital competencies of elementary school teachers for the 21st century.

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ZASTUPLJENOST IKT RESURSA U NASTAVI PREDMETA MUZIČKA KULTURA U PRVOM CIKLUSU OBRAZOVANJA I VASPITANJA

U obrazovnom sistemu Republike Srbije, muzička kultura je zastupljena tokom obrazovnog razvojnog puta kao značajna oblast koja doprinosi kulturnom razvoju učenika i formiranju i usavršavanju muzičkih preferencija. U novijoj nastavnoj praksi predmeta Muzička kultura, postoje tendecije koje idu u prilog osavremenjavanju i unapređenju vaspitno-obrazovnog procesa. U svrhu ovog istraživanja konstruisan je upitnik i sprovedeno je istraživanje u kojem je učestvovalo 126 učitelja (N=126) sa teriorije Republike Srbije. Sprovedeno je empirijsko, neeksperimentalno istraživanje kroz korišćenje deskriptivne metode i tehnike anketiranja. Shodno tome, u radu se razmatraju iskustva i stavovi učitelja o primeni informaciono-komunikacionih tehnologija (IKT), digitalnih resursa i njihov povoljan uticaj na proces realizacije nastave muzičke kulture. U kontekstu primene određenih softvera i aplikacija, velikom broju ispitanika, čini se, nedostaju kompetencije koje bi uticale na konkretniju i redovniju primenu u okviru određenih oblasti predmeta Muzička kultura. Od ukupnog broja ispitanika sa teritorije Republike Srbije, većina od 81,7% podržava uvođenje i pribegava inovacijama koje podrazumevaju aktivno korišćenje resursa IKT-a u nastavi. Međutim, primetno je veće neslaganje kada su u pitanju konkretni softveri i alati i njihovo korišćenje u određenim oblastima i pri obradi gradiva muzičke kulture. Iskustvo pokazuje da je neophodno pokrenuti i ubrzati rad na podizanju digitalnih kompetencija učitelja kako bi se učenicima pružila prilika da ostvare pun potencijal.

Ključne reči: *nastava muzičke kulture, učitelj, učenici, informaciono-komunikaciona tehnologija (IKT).*